veteran ornithologist of the same name) which deserves special attention, as devoted to a somewhat neglected and imperfectly known group of the class of mammals—the Manatees or "sea-cows," as they are popularly called. The Manatees constitute, as is well known, one of the three modern representatives of the formerly more extensive order of Sirenians, or "Herbivorous Cetaceans," as they are sometimes, though not very correctly, denominated; for it is doubtful whether they have any near relationship to the true Whales. One of these three forms—the *Rhytina stelleri*—is already extinct; the other two—the Manatee and Dugong—are rapidly diminishing in numbers before the advancing tide of civilisation, and it is highly desirable that full details of their structure and habits should be obtained and recorded before they are "improved" off the face of the earth.

Dr. Hartlaub, having examined the skulls and other specimens of Manatees preserved in the various museums of the Continent, presents us with a *résumé* of his investigations in two well-ordered and well-illustrated essays. In the first of these he describes the skull of the African Manatee (*Manatus senegalensis*), and compares it bone by bone with that of the American *M. latirostris*, fully establishing the specific difference of the two forms, which has been doubted even by some of our most recent and best authorities.[1] In the second memoir he describes for the first time the skull of the South American *Manatus inunguis*, a species absolutely ignored by the great majority of naturalists, and shows its distinctness from *M. latirostris.*

It is hardly necessary even to recapitulate the points of difference between these three forms of Manatees, which Dr. Hartlaub has given at full length in these memoirs, and which seem to be sufficiently obvious on reference to his well-drawn figures. But a few words may be added on the geographical distribution of the three living Manatees, so far as this is at present known to us.

The African Manatee inhabits the west coast of that continent from the Senegal down to the Quanza, and penetrates up the larger rivers far into the interior. In the Senegal it has been recorded by Adanson, in the rivers of Liberia by Büttikofer, in the Niger and Benué by Barth and Vogel, in Gaboon by Du Chaillu, in the Lower Congo by Johnston and Pechnel-Loesche, and in the Quanza by Monteiro. Whether the "*Charuf el bachr*," or water-sheep, ascertained to exist in the Uelle by Schweinfurth, which is probably the same as the supposed Manatee found in the Shari and Lake Tchad by Barth and other travellers, should be referred to *Manatus senegalensis*, or is even a Manatee at all, remains an interesting subject for future inquiry. But it seems tolerably certain that some sort of Sirenian inhabits the inland basin of Lake Tchad, and the probability is that it will turn out to be a *Manatus.*

In America the exact boundaries of the two species, *Manatus latirostris* and *M. inunguis*, cannot yet certainly be stated, owing to the confusion that has hitherto existed between these two forms. But it is certain that the Manatee occurs on the Atlantic coast of America from 25° N.L. to 19° S.L., and that those of the Antilles, the Gulf of Mexico, and Surinam, are referable to *M. latirostris.* On the other hand, *M. inunguis* is only certainly known from the Amazons and its tributaries, where it was first discovered by Natterer. Dr. Hartlaub is inclined to believe that the Manatee of the coast and rivers of South-East Brazil must be likewise *M. inunguis*, but this does not seem to be probable. It is more likely, we think, to turn out that one species is found all along the Atlantic sea-board, penetrating only slightly up the rivers, while the other is confined to the interior, and is a purely fresh-water species.

OUR BOOK SHELF

Infant-School Management. By Sarah J. Hale. (London: Stanford, 1886.)

THIS is one of the best books on infant-school management that we have seen; the authoress knows exactly the kind of information infants can most readily assimilate, and how best to impart it; while on the other hand she is fully aware how dangerous and worse than useless the forcing process is.

The second part of the book consists of sketches of lessons in natural history, natural phenomena, food-plants, and common objects; and if science is to be taught in all our infant schools in the manner our authoress suggests, we may look forward to a largely increased taste for science in the rising generation.

Here is an extract from the introduction to the second part showing the method of teaching which she recommends:—

"In every case the teacher must bring plenty of illustration to bear upon the lesson. In natural history *the real animal* or a good picture, and if possible, some thing or things that it furnishes us with, as, for instance, the fur of the otter, the shell of the tortoise, the quills of the porcupine. Also the teacher should carefully provide herself with pictures of animals which afford strong contrasts to the one with which she is dealing, as well as those which bear some general resemblance to it, that she may exercise the *discriminative* as well as the *assimilative* faculty of her pupils. In all object lessons, various specimens of the object should be produced for examination and description; the little ones themselves must do the main part of the latter under the teacher's guidance, for these lessons are not only to enable the children to form new ideas, but they are also intended to train them in giving expression to such ideas. The teacher must make good use of the black-board, and should practise drawing objects, so that she may illustrate with facility and precision any particular point of her lesson which can be so illustrated. All the materials, pictures, diagrams, &c., which the teacher provides from time to time, should have their place in the school museum ready for future needs, and the children should be encouraged to bring contributions to such a museum, particularly such as the lessons they receive may suggest. Object-lesson cards, pictures, and all illustrations should be carefully used, and when not in use, have their proper places on wall or shelf. The teacher should arrange all specimens in the museum, and have each addition neatly labelled and catalogued."

A Year in Brazil. By Hastings Charles Dent, C.E., F.L.S., F.R.G.S. With 10 Full-page Illustrations and 2 Maps. (London: Kegan Paul, Trench, and Co., 1886.)

THIS is a very interesting account of a year's sojourn in an interesting country, and although the author went out for a special purpose, to survey for a railway, every moment of his spare time was taken up in making collections and taking notes in most of the branches of natural history. The scientific interest of the book is mainly

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[1] Cf. Flower, "Catalogue of Vertebrates" in the Museum of the Royal College of Surgeons, part 2, p. 528, 1884.

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confined to the notes on animals, birds, reptiles, insects, and the parasitic torments of Brazil, notes on botany and on geology, together with a discussion of the theory of evolution and observations made on protective colouring and mimicry.

With reference to the theory of evolution the author states that he has constantly endeavoured to oppose it, on the ground apparently put forward by theologians many years ago before they knew what the theory really was; and we think that if our author will continue his scientific studies a little longer he will probably find that the arguments he uses against it are really not in point.

The Colloquial Faculty for Languages. By Walter Hayle Walshe, M.D. Second Edition. (London: Churchill, 1886.)

THIS is a book full of pleasant gossip round the central idea embodied in its title; hence we have essays on the nature of genius, the conditions regulating colloquial faculty, and the causes of variety of colloquial faculty and faculty for translation.

In the chapter on composition in foreign tongues it is pointed out that the man of science proves now and then well capable of wrestling effectively with the humorist on his own ground of the *literæ humaniores*, and gives as an example Herbert Spencer's *exposé* of abounding errors in a passage from Addison quoted by Matthew Arnold, as an example of classical English.

We gather from our author that the English race is not the most gifted with the colloquial faculty, and a remark of Prince Bismarck's is quoted that he had always found that an Englishman who could speak good French was a doubtful character.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.*]

Periodicity of Glacial Epochs

PERMIT me to ask, as a matter of international comity in science, the help of my learned British colleagues in the following matter.

I am just now occupied upon a work treating upon the periodicity of glacial epochs, a question which has already been broached by me in previous writings several years ago. The cause of this phenomenon being attributed by the astronomers, as well as by the majority of geologists, to the displacement of the perihelion, whose cycle is 21,000 years, it follows that, according to the actual position of this point, the ice now covering the Antarctic regions had its maximum of intensity at about the year 1250 of our era. For the same reason, the ice of the boreal hemisphere must have offered at this same epoch its minimum of intensity. Consequently the latter must have been increasing since the close of the thirteenth century, while the former must have been receding. The researches of European geologists must have shown a marked extension of the glaciers of Spitzbergen, Greenland, &c., since the beginning of the fourteenth century, and a recession of vegetation from the latitude of Sicily to the Polar Circle. But we in France are not informed of what has happened in the southern hemisphere since the arrival of the first navigators. I would therefore, in the name of science, beg of any British officers, consuls, or scientific observers who are, or may have been, collecting facts at stations near the South Pole, in Patagonia, New Zealand, Tasmania, and elsewhere, to communicate to me directly, or through your columns, any information they may have upon this subject. I wish to know whether, since the first arrival of Europeans in those regions, the ice-field has shown a recessive movement, accompanied by an inverse tendency of vegetation.

Tarascon, Ariège, June 27 ADOLPHE D'ASSIER

Evidence of Man and Pleistocene Animals in North Wales prior to Glacial Deposits

SOME of the results recently obtained during the researches carried on at the Tremeirchion caves under the superintendence of Mr. E. Bouverie Luxmoore and myself, seem to me of so much importance that I have thought it advisable to communicate them, in anticipation of the full report which will be presented to the British Association, especially as an important section is now exposed, and may be examined by any one desiring to do so, which will probably have to be covered before the end of the summer.[1]

In continuing our explorations this year, by means of a grant from the British Association, we found that the Cae Gwyn Cave (described in my paper in the *Quart. Journ. Geolog. Soc.* for February last) had come to an abrupt termination in a plateau of Glacial deposits. On further examination it was found that this must have been the main entrance into the cavern when it was occupied by the Pleistocene animals, and that the Glacial beds in and upon it must have been deposited subsequent to the occupation by the animals. As in the other parts of the cavern, the cave-earth at the entrance—a brown sandy clay, contained fragments of a stalagmite floor and of stalactites along with angular fragments of limestone. The bones also occurred at all angles, showing that the contents had been greatly disturbed by water action. The bone earth was covered over at the entrance and for some distance inwards by a few feet of stratified sand, containing well-scratched boulders, and it, as well as the sand, was traced for a distance of fully 6 feet beyond the entrance under the series of Glacial deposits, shown in the section.

In digging outside the entrance, the floor of which is 20 feet below the surface of the field, it was soon found that we could not extend our researches outwards, owing to the nature of the lower deposits, chiefly sands and gravels, without making an opening into the field. By the kindness of the owner, Mr. Edwin Morgan, a shaft was allowed to be dug in front of the opening, about 9 feet across at the surface and over 5 feet at the bottom. This shaft was subsequently widened at the bottom, in consequence of some falls, and the lower part, except at one point, had to be carefully faced with timber. The upper part of the shaft is now much widened and sloped. To make it certain that the Glacial deposits are continuous from the shaft in a westerly direction, I had the beds probed at different points for a distance of about 70 feet; and subsequent examination showed clearly that there is here an extensive terrace of drift reaching to heights of between 400 and 500 feet above Ordnance datum. The section was carefully taken at two different points in the shaft by Mr. C. E. de Rance, F.G.S., of the Geological Survey, and myself, and in doing so we found well-scratched boulders in each of the deposits. Among the boulders found are granites, quartzites, flint, felstones, diorites, volcanic ash, Silurian rocks, and limestone. Silurian rocks are most abundant. It is clear that we have here some rocks from northern sources along with those from the Welsh hills, and the manner in which the limestone at the entrance to the cavern is smoothed from the north would indicate that to be the main direction of the flow. A small but well-worked flint flake was dug up from the bone earth on the south side of the entrance on June 28, in the presence of Mr. G. H. Morton, F.G.S., of Liverpool, and myself. Its position was about 18 inches below the lowest bed of sand. Several teeth of hyæna and reindeer, as well as fragments of bone, were found at the same place, and at other points in the shaft teeth of rhinoceros and a fragment of a mammoth's tooth. One rhinoceros tooth was found at the extreme point examined, about 6 feet beyond and directly in front of the entrance. It seems clear that the contents of the cavern must have been washed out by marine action during the great submergence in mid-Glacial time, and that they were afterwards covered by marine sands and by an upper boulder-clay, identical in character with that found at many points in the Vale of Clwyd, and in other places on the North Wales coast.

The facts obtained seem to me to prove conclusively that man and the Pleistocene animals must have lived in parts of the North Wales area, and have occupied some of the caverns, before the period of the great submergence indicated by the Moel Tryfaen and other high-level sands; hence certainly before the Upper Boulder-Clay was deposited. HENRY HICKS

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[1] Tremeirchion is about four miles from St. Asaph, and less than two miles from Bodfari Station on the Chester Mold, and Denbigh line.

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